

GALILEO AT IO: RESULTS FROM THE NEAR-INFRARED MAPPING SPECTROMETER

Rosaly Lopes-Gautier, R.W. Carlson, W.D. Smythe (JPL), A. S. McEwen (LPL), J.R. Spencer (Lowell Observatory), A.G. Davies, L.W. Kamp (JPL), L. Soderblom (USGS)

The Near-Infrared Mapping Spectrometer (NIMS) on Galileo is observing Io during the spacecraft's two close encounters with this moon in October 1999 (orbit I24) and November 1999 (orbit I25). The spectral range of NIMS (0.7 to 5.2 microns) allows the instrument to investigate Io's surface composition, measure thermal emission from the volcanic regions, and to search for selected atmospheric species. Our observing strategy for both the I24 and I25 orbits is to obtain, wherever possible, nearly-concurrent observations with Galileo's Solid State Imaging experiment (SSI) and the Photopolarimetry Radiometer (PPR). This strategy enhances the science return because of the increased wavelength range and, in the case of SSI (which has a larger field of view than NIMS), regional context. The NIMS observations are of three types: nightside, to measure thermal emission from hot spots; dayside, to measure surface composition; and limb scans, to try to detect SO₂ and other gases from active plumes and to measure thermal emission from the plume column. The spatial resolution of NIMS during these observations ranges from 0.3 km to 25 km/NIMS pixel. The observations obtained at closest range consist of single NIMS fields of view (typically 3 to 5 spectra over the same terrain to increase signal/noise) placed within SSI frames in order to obtain local context. Observations obtained further away consist of regional NIMS mosaics, both of the surface and of the atmosphere above the limb where plumes may be active. The areas targeted include many of the persistent hot spots, including Loki, Pele, and Pillan, as well as deposits of red, green, and black materials. We expect that our results will include: (a) the detection of previously unknown species on Io's surface and, possibly, atmosphere; and (b) measurements of the temperatures of several volcanic areas close to vents, enabling a better assessment to be made as to how widespread ultramafic-type eruption temperatures are on Io.